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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :
HIDEKI YOSHIOKA ET AL : EXAMINER:
SERIAL NO: NEW DIVISIONAL APPLICATION : GROUP:
FILED: HEREWITH :
FOR: ULTRASONIC PICTURE PROCESSING :
METHOD AND PICTURE PROCESSING
APPARATUS

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER OF PATENTS
WASHINGTON, DC 20231

SIR:

Prior to examination on the merits, please amend the above-identified patent application as follows:

IN THE CLAIMS

Please cancel without prejudice Claims 1-39.

Please add new Claims 40-58 as follows:

40. (New) A heart function analysis apparatus comprising:

an extraction section configured to extract a cardiac wall contour from each of a plurality of heart images generated in a time-series;

a division section configured to divide the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference; and

means for obtaining an amount of a cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another.

41. (New) The apparatus according to claim 40, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valva and a papillary muscle.

42. (New) The apparatus according to claim 40, wherein said means for obtaining a cardiac wall movement comprises:

means for classifying the cardiac wall contour divisions for plural positions of a cardiac wall to display at least the adjacent contour divisions with different colors or different luminance.

43. (New) A heart function analysis apparatus comprising:

an extraction section configured to extract a cardiac wall contour for each of a plurality of heart images generated in a time-series;

a division section configured to divide the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference;

determination means for determining from the heart images an image corresponding to a reference time;

means for obtaining an amount of movement from the cardiac wall contour divisions corresponding to the image corresponding to the reference time or division points of the cardiac wall contour divisions, for each cardiac wall contour division or each division point; and

a display device configured to display the amount of movement with one of a numerical display, a graphical display and a color display of the cardiac wall.

44. (New) A heart function analysis apparatus comprising:

- an input section configured to input heart images generated in a time-series and speed information of heartbeats synchronizing with the heart images;
- an extraction section configured to extract a cardiac wall contour for each heart image;
- a division section configured to divide the cardiac wall contour of each heart image into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference;
- a classification section configured to classify the speed information of heartbeats for each of positions of the cardiac wall contour divisions;
- means for obtaining a speed statistic for each position of the cardiac wall contour divisions; and
- a display device configured to display the speed statistic with at least one of a numerical display, a graph display and a color display of a cardiac wall.

45. (New) A heart function analysis apparatus comprising:

- an input section configured to input heart images generated in a time-series and speed information of heartbeats synchronizing with the heart images;
- an extraction section configured to extract a cardiac wall contour from each heart image;
- a division section configured to divide the cardiac wall contour into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference point;
- means for obtaining an amount of movement of each cardiac wall contour division for each position of the cardiac wall contour divisions;

a detection section configured to detect a dynamic range of the amount of movement for at least one of each cardiac wall contour division and each division point of the cardiac wall contour division;

an allocation section configured to allocate a display color, used for displaying the speed information on a display screen, to the dynamic range; and

a display device configured to display the speed information on the display screen with the allocated color.

46.(New) A heart function analysis apparatus comprising:

means for extracting a plurality of cardiac wall contours from a plurality of heart images generated in a time-series;

means for dividing each of the cardiac wall contours into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference; and

means for obtaining an amount of a cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another.

47.(New) The apparatus according to Claim 46, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valva and a papillary muscle.

48. (New) The apparatus according to claim 46, wherein said means for obtaining a cardiac wall movement comprises:

means for classifying the cardiac wall contour divisions for each position of a cardiac wall; and

a display device which displays at least adjacent contour divisions with different colors or different luminance.

49. (New) A heart function analysis apparatus comprising:

means for extracting a plurality of cardiac wall contours from a plurality of heart images generated in a time-series, respectively;

means for dividing each of the cardiac wall contours of each of the heart images into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference;

means for determining from the heart images an image corresponding to a reference time;

means for obtaining an amount of movement from the cardiac wall contour divisions corresponding to the image corresponding to the reference time or division points of the cardiac wall contour divisions for each cardiac wall contour division or each division point; and

a display device configured to display the amount of movement with one of a numerical display, a graphical display and a color display of the cardiac wall.

50. (New) A heart function analysis apparatus comprising:

means for inputting a plurality of heart images generated in a time-series and speed information of heartbeats synchronizing with the heart images;

means for extracting a plurality of cardiac wall contours from the heart images, respectively;

means for dividing each of the cardiac wall contours of each heart image into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference;

means for classifying the speed information of heartbeats for each position of the cardiac wall contour divisions;

means for obtaining a speed statistic for each position of the cardiac wall contour divisions; and

a display device configured to display the speed statistic with at least one of a numerical display, a graph display and a color display of a cardiac wall.

51. (New) A heart function analysis apparatus comprising:

means for inputting a plurality of heart images generated in a time-series and speed information of heartbeats synchronizing with the heart images;

means for extracting a plurality of cardiac wall contours from the heart images, respectively;

means for dividing each of the cardiac wall contours into a plurality of cardiac wall contour divisions, using a point having a structural feature of the heart as a reference point;

means for obtaining an amount of movement of each cardiac wall contour division for each position of the cardiac wall contour divisions;

means for detecting a dynamic range of the amount of movement for each cardiac wall contour division or each division point of the cardiac wall contour division;

means for allocating a display color, used for displaying the speed information on a display screen, to the dynamic range; and

a display device configured to display the speed information on the display screen with the allocated color.

52. (New) A heart function analysis method comprising:

extracting a cardiac wall contour from each of heart images generated in a time-series;

dividing the cardiac wall contour of each of the heart images into a plurality of cardiac wall contour divisions using a point having a structural feature of the heart as a reference; and

obtaining an amount of cardiac wall movement by correlating the cardiac wall contour divisions of one of the heart images to those of another.

53. (New) The method according to claim 52, wherein the point having a structural feature corresponds to at least one of a cardiac apex, an annulus valva and a papillary muscle.

54.(New) The method according to claim 52, wherein the step for obtaining a cardiac wall movement comprises:

classifying the cardiac wall contour divisions for each position of a cardiac wall to display at least the adjacent contour divisions with different colors or different luminance.

55. (New) The method according to claim 52, further comprising:

determining a reference image corresponding to a reference time point from among the heart images generated in a time series; and

said step of obtaining an amount of cardiac wall movement obtaining the amount of cardiac wall movement from the reference image for each cardiac wall contour division or each division point of the cardiac wall contour division.

56. (New) The method according to claim 55, further comprising:

displaying at least the amount of cardiac wall movement with different colors or different luminance.

57.(New) The method according to claim 52, further comprising:

classifying the speed information of heartbeats for each position of the cardiac wall contour divisions;

obtaining a speed statistic for each position of the cardiac wall contour divisions; and

displaying the speed statistic with at least one of a numerical display, a graph display and a color display of the cardiac wall.

58, (New) The method according to claim 52, further comprising:
detecting a dynamic range of an amount of movement of each cardiac wall contour
division or division point; and
allocating a display color used for displaying the speed information of heartbeats on a
display screen to the dynamic range.--

REMARKS

Favorable consideration of this application as presently amended and in light of the
following discussion is respectfully requested.

Newly submitted Claims 40-58 directed to the species of Figs. 51-69 are active in this
case, original Claims 1-39 having been canceled by way of the present Preliminary
Amendment. No new matter has been added.

Examination on the merits of Claims 40-58 is believed to be in order, and an early and
favorable action is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Registration No. 25,550
Eckhard H. Kuesters
Registration No. 28,870



22850

Telephone: (703) 413-3000
Facsimile: (703) 413-2220
GJM/EHK:mlh